

# Service Manual



**440C-G**

p/n N84001

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INSTALLATION DATE

PART NUMBER

---

MAKE/MODEL

SERIAL NUMBER

---

SELLER

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ADDRESS

CITY/STATE/ZIP

NOTES:

**Phone: 1-877-7ZEPPRO (1-877-  
793-7776)**  
**Email: [zepprofessional@zep.com](mailto:zepprofessional@zep.com)**

**Zep Inc.  
1310 Seaboard Ind. Blvd.  
Atlanta GA 30318**

# Specifications

## PERFORMANCE

Discharge Volume	4.0 gal/m / 15.1 L/m
Pump Head Pressure	4000 psi / 275 bar

## GENERAL

Minimum Inlet Water Pressure	over 65 psi may require water inlet regulator
Spray Tip	10 psi / 0.68 bar
Weight	(#4.0 - 15") p/n JA0-15040-2
Hose Assembly	435 lbs / 170 Kg
Hose Assembly	3/8" x 50' 4000psi
Hose	p/n 3401-00701A
Coupler	3/8" x 50' p/n K02-03150E5
Belt	p/n W04-34155-A
Trigger Gun & Wand	p/n R02-00246
- Trigger Gun	p/n J06-00158-B
- Trigger Wand	p/n J06-00158
	p/n J06-00104EZ

## PUMP ENGINE

Engine	F05-00439B
Engine Horsepower	16 HP / 12 KW
Engine Fuel	Gasoline
Engine Make	Vanguard
Engine Regulator	P/N F05-00440-02
Engine Charge Rate	20 AMP
Engine Start	Electric
Engine Oil Filter	p/n F05-00441-02
Engine Air Filter	p/n F05-00422-3
Engine Air Pre-Cleaner	p/n F05-00442-4



*Zep has a full line of pressure washer parts and accessories available.*



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## SAFETY AND OPERATION

### GAS ENGINE DRIVEN COLD WATER CLEANER

#### MACHINE UNPACKING


ALL CLEANERS ARE CAREFULLY INSPECTED AND CARTONED TO PROTECT AGAINST SHIPPING DAMAGE. IF THERE IS DAMAGE OR MISSING PARTS, THE TRANSPORTATION COMPANY AGENT SHOULD MAKE A NOTATION TO THAT EFFECT ON THE BILL. REFER TO THE PARTS LIST IN THIS MANUAL AND ADVISE WHAT PARTS ARE MISSING OR DAMAGED. IF AVAILABLE, GIVE THE INVOICE NUMBER ON ALL ORDER BILLS. THIS PROCEDURE WILL ENABLE NEEDED PARTS TO BE SHIPPED QUICKLY.

**READ ALL** Installation, Operation, and Maintenance instructions before operating the machine.


**NOTE:** Refer to **CLEANER MODEL** for **SERIAL NUMBER** location.


**NOTE:** Dimensions are in inches unless otherwise noted.


#### IMPORTANT SAFETY INSTRUCTIONS

The safety alert symbol.  This symbol is used to identify safety information about hazards that can result in personal injury.

A signal word (DANGER, WARNING, or CAUTION) is used with the alert symbol to indicate the likelihood and the potential severity of injury. In addition, a hazard symbol may be used to represent the type of hazard

 **DANGER** indicates a hazard which, if not avoided, will result in death or serious injury.

 **WARNING** indicates a hazard which, if not avoided, could result in death or serious injury.

 **CAUTION** indicates a hazard which, if not avoided, might result in minor or moderate injury.


**CAUTION**, when used **without** the alert symbol, indicates a situation that **could result in damage to the equipment**.

**Read and understand this “OPERATOR’S MANUAL” and “LABELS ON THE MACHINE” before starting.**



#### GENERAL SAEFTY

1. Before operating this machine, read and observe all safety, unpacking, and operating instructions. Failure to comply with these instructions could create a hazardous situation.
2. The operator of this equipment should not operate this equipment when fatigued or under influence of alcohol or drugs.
3. The operator of this equipment should be thoroughly familiar with its operation and trained in the job to be accomplished.
4. The operator of this equipment should wear protective face shields and other protective clothing as required for safe operation.
5. Always point the gun assembly in a safe direction and do not direct spray on the cleaner.
6. Do not operate the machine if any mechanical failure is noted or suspected.
8. Do not leave this machine unattended when it is operating.
9. All installations must conform to all applicable Local codes. Contact your electrician, plumber, utility company or seller for details.

 **WARNING:** RISK OF INJECTION OR SEVERE INJURY. KEEP CLEAR OF NOZZLE. DO NOT DIRECT DISCHARGE STREAM AT PERSONS. THIS EQUIPMENT IS TO BE USED ONLY BY TRAINED OPERATORS.

**AVERTISSEMENT:** RISQUE D'INJECTION ET DE BLESSURES GRAVES. SE TENIR À L'ÉCART DU JET. NE PAS DIRIGER LE JET DE SOTIE VERS D'AUTRES PERSONNES CONFIER L'UTILISATION LE JET DE SOTIE VERS D'AUTRES PERSONNES. CONFIER L'UTILISATION DE CE MATÉRIEL À UN OPÉRATEUR QUALIFIÉ.

**ADVERTENCIA:** RIESGO DE LA INYECCIÓN O SEVERO LESIÓN. CLARO DE LA SUBSISTENCIA DEL INYECTOR. NO DIRIJA LA CORRIENTE DE LA DESCARGA EN LAS PERSONAS. ESTO EL EQUIPO DEBE SER UTILIZADO SOLAMENTE POR LOS OPERADORES ENTRENADOS.



**WARNING:** Never put hands or fingers in wash spray. DO NOT point the gun assembly toward your body or at anyone else. Failure to do this could result in serious injury.



**WARNING:** Avoid the exhaust areas as they are dangerously hot during and a short time after operation.



**WARNING:** DO NOT run engine in an enclosed area. Exhaust gases contain carbon monoxide, an odorless and deadly poison.

10. If a water leak is found, **DO NOT OPERATE THE MACHINE**. Shut off the motor and repair.
11. Do not start the machine unless the gun assembly is firmly gripped by the machine operator. Failure to do this could result in injury from a flying hose and gun assembly.
12. All guards, shields, and covers must be replaced after adjustment are made to prevent accidental contact with hazardous parts.
13. If chemicals are used in conjunction with this equipment, read and follow the product label directions.
14. Do not refuel the machine while it is running or hot. Allow it to cool sufficiently to prevent ignition of any spilled fuel.
15. Drive belts must be inspected and tightened periodically to operate at optimum levels.
16. Inspect machine for damaged or worn components and repair or replace to avoid potential hazards. Do not operate the machine if any mechanical failure is noted or suspected.
17. Always use the correct size spray tip specified in the GENERAL section of the **MODEL SPECIFICATIONS** or **MODEL EXPLODED VIEW**.
18. Do not start the engine until you have observed all safety instructions and operating found in the operating manual.

## **SAVE THESE SAFETY INSTRUCTIONS**

## **OPERATION**

### **PRE START-UP**

1. The first time the machine is operated, after repairs have been made, or if the machine has set for a period of time (30 days or more) follow the following procedures.
  - A. Check the tension of the belt (if so equipped) per instructions in **MACHINE MAINTENANCE**.
  - B. Flush the machine per instructions in **MACHINE MAINTENANCE**.
2. **CAUTION:** Always use the factory supplied wash hose with your machine. **Do not** substitute other hoses as a potential safety problem may develop.

**CAUTION:** If machine has been exposed to sub-freezing temperatures, it must be thoroughly warmed to above freezing before operating. Failure to warm machine can cause damage to the pump packings and other components.

### **START-UP**

- .. **Refer to the MAINTENANCE SCHEDULE for any maintenance to be performed before operation**
  - .. **OIL LEVEL:** Check the oil level in the water pump.
  - .. **BELT:** Make sure belt tension and condition is as specified in MACHINE MAINTENANCE.
  - .. **METERING VALVE ( if so equipped):** Make sure the metering valve is closed before operation. If air enters the system through this valve, poor performance and machine damage will occur. Refer to the metering valve insert for proper operation.
  - .. **WATER SUPPLY:** This machine must have a water supply meeting or exceeding the maximum discharge volume specified in the PERFORMANCE section, and a minimum water inlet pressure of 40 PSI /12.1KGM.
1. Turn water supply.
  2. With the gun assembly in hand (on trigger gun models hold the trigger gun valve in open position) and with a good flow of water turn the switch to the "pump" position.

**CAUTION:** A good flow of water must be flowing from the end of a gun for 30 seconds, before proceeding. Lack of water can cause damage to the water pump and like components.

**CAUTION:** On a machine equipped with a trigger gun valve, if the trigger gun valve remains in the closed position for more than 3 minutes, water pump damage may occur.

**4. TO APPLY CHEMICAL:**

- A. Mix chemicals per label instructions. Use necessary safety precautions.
- B. Insert chemical screen into chemical container
- C. Adjust metering valve (if so equipped).
- D. If the gun assembly is equipped with variable or multiple nozzle assembly, adjust as desired.

**TO RINSE:**

- A. Close the chemical metering valve (if so equipped). NOTE: It is advisable to dip the chemical screen in a container of clean water and open the valve 1 minute to clean the valve of any remaining residue.
- B. If the gun assembly is equipped with variable or multiple nozzle assembly, open and close to clean nozzle of any remaining residue.
- C. Start from the top, working downward using long, overlapping strokes.

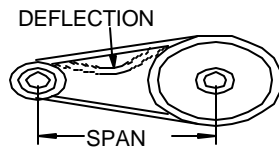
## ***SHUT-DOWN***

- 1. Shut down per engine owners manual.
- 2. Turn off the water supply.
- 3. If freezing conditions may exist, refer to STORAGE in **MACHINE MAINTENANCE**.
- 4. Refer to engine owners manual for proper engine storage.



## MACHINE MAINTENANCE

### Gas Engine Driven Cold Water Cleaners



1. Correct belt tension will allow a 1/64- inch deflection for each inch of span between pulley centers with a 6-pound force applied in the middle of the span.

EXAMPLE: A 6-pound force applied at the middle of an 8 inch span should produce a deflection of 8/64 inch or 1/8 inch.

2. Belts can be tightened or loosened by loosening the nuts holding the pump assembly to the motor mount. Then tighten or loosen the j-bolt on the motor mount. Retighten the pump assembly after the desired tension is reached.

### SPRAY TIP MAINTENANCE

1. Remove the spray tip from the gun assembly.
2. Blow out debris with compressed air from the outside in. Any debris remaining in the inlet side of the nozzle should be cleaned out. If lime or chemical scale is present in the inlet side, the nozzle may be soaked in descaling solution or replaced. If the tip is worn, replace with one specified in the GENERAL section of **MODEL SPECIFICATIONS** or **MODEL EXPLODED VIEW**.
3. Before replacing spray tip flush the machine per "FLUSHING".
4. Reinstall Spray tip to gun assembly.

### FLUSHING

1. Connect machine to a pressurized water supply meeting the requirements specified in the GENERAL section of the **MODEL SPECIFICATIONS**.
2. Turn on the water supply.
3. Remove the spray tip from gun assembly.
4. With gun assembly in hand, start engine. On trigger gun models hold the trigger gun valve in open position.

**CAUTION:** DO NOT RUN PUMP WITHOUT WATER, AS THIS WILL CAUSE DAMAGE TO THE PUMP AND VOID WARRANTY.

5. When clean water flows from the gun, turn switch to the "OFF" position.
6. Reinstall spray tip.
7. With the gun assembly in hand, turn on the switch. On trigger gun models hold the trigger gun valve in open position.
8. When clean water flows from the gun, turn switch to the "OFF" position.
9. If freezing conditions may exist, refer to "STORAGE" section.
10. Turn off and disconnect the water supply. Disconnect electrical supply.

### STORAGE

1. Rinse the chemical line by inserting the screen into a container of clear water and open the metering valve 1 minute to clean it of any remaining residue. Be sure the chemical metering valve is closed when finished.
2. Disconnect the water supply.
3. Remove the spray tip nozzle from gun assembly and wire to machine.
4. Attach an air chuck to the air valve stem on the pump assembly. With the trigger gun in the open position, apply air until a mixture of air and very little water is coming from the gun wand .
5. Fill a 1-gallon container with Ethylene Glycol type antifreeze. Minimum should be a mixture of ½ antifreeze and ½ water strength before each use, as the antifreeze will dilute with use.
6. Install a 2-ft garden hose to the water inlet. Insert the other end into a container of antifreeze solution.
7. With the gun assembly in hand, turn on the switch. On trigger gun models hold the trigger gun valve in open position.
8. Turn off the switch just prior to running out of antifreeze mixture.
9. Disconnect gun and hose.
10. Place machine and battery in a dry place protected from weather conditions.

## MACHINE MAINTENANCE SCHEDULE

ENGINE DRIVEN OIL FIRED COLD WATER CLEANERS	DAILY	EACH HR 8 HRS	AFTER FIRST 50 HRS	EVERY 50HRS	EVERY 100 HRS	EVERY 500 HRS	YEARLY
<b>OIL BATH WATER PUMP:</b> <b>Oil Level</b> - check and add as needed per PUMP SERVICE insert. <b>Oil Change</b> - drain and refill per PUMP SERVICE insert. <b>CAUTION:</b> Used oil must be disposed into an enviromental safe container and brought to an oil recycling center. <b>Oil contamination</b> - Milky color indicates water.	●		●			●	
<b>HOSES:</b> <b>Blistering, Loose Covering</b> <b>Abrasion</b> of cover exposing reinforcement. <b>Cuts</b> exposing reinforcement.	● ● ●						
<b>BELTS:</b> <b>Cracks or fraying</b> <b>Belt Tension</b> - For correct tension, see MACHINE MAINTENANCE insert.	●	●		●			
<b>LEAKS:</b> <b>Check</b> for water and buildup of scale at pipe connections.	●						
<b>SCREEN-WATER:</b> <b>Check Inlet Hose Screen</b> for debris. <b>Check float Tank Hose Screen</b> ( if so equipped) for debris. <b>Check Water Filter</b> (if so equipped) for debris see breakdown elsewhere in this manual.	● ● ●						
<b>SPRAY TIP:</b> <b>Check tip</b> for debris.	●						
<b>GUARDS AND SHIELDS:</b> Check that all guards and sheilds are in place and secure.	●						
<b>PUMP MOTOR WITH GREASE FITTINGS:</b> Remove drain plug. Use 1 or 2 full strokes of shell "DOBLIUM RB", Cheveron"SR1 No.2" or Texaco "PREMIUM RB". Operate for 20 minutes and replace drain plug.							●
<b>FREEZING TEMPERATURES:</b> Freezing temperatures break coils and water pumps. See STORAGE in the <b>MACHINE MAINTENANCE</b> section for cold weather instructions.	●						

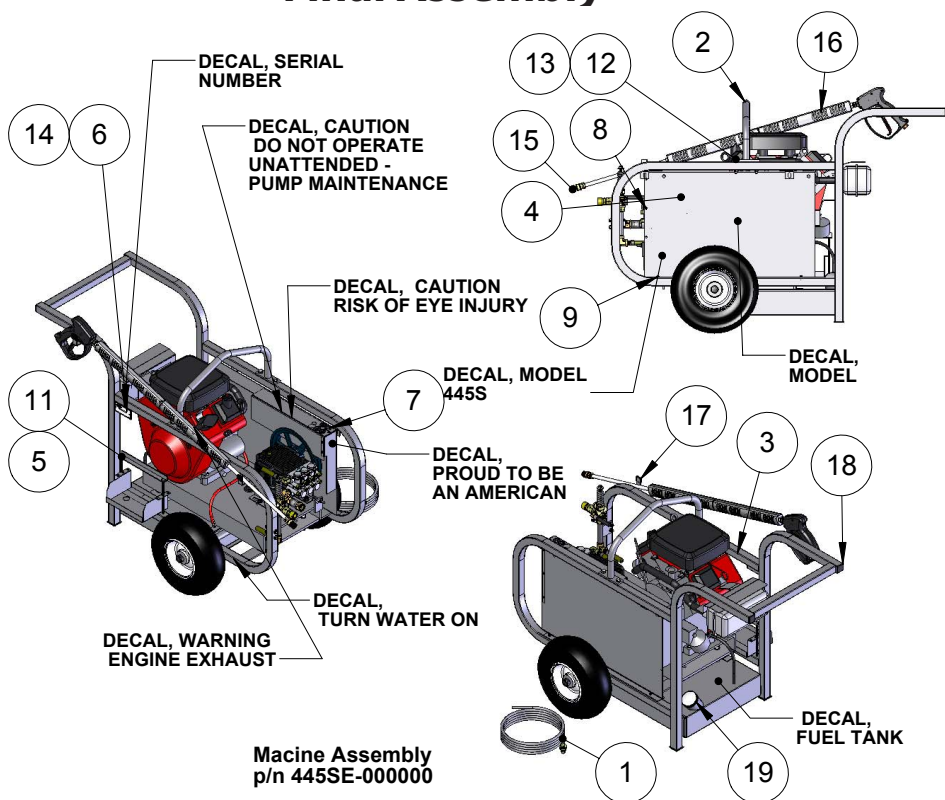
## CLEANER TROUBLESHOOTING ENGINE DRIVEN COLD WATER CLEANERS

TROUBLE	POSSIBLE CAUSE	REMEDY
1. Poor cleaning action.	<p>A. Hard water. B. Low pressure. C. Little or no chemical being drawn. D. Improper chemical. E. Improper chemical mixture.</p> <p>F. Low discharge pressure.</p>	<p>A. Connect the machine to a water softner. B. See "Low operating pressure." C. See "machine will not draw chemical." D. Obtain proper chemical. E. Mix chemical per the label. Follow all the mixing, handling, application, and disposal instructions. F. See "Low operating pressure."</p>
2. Machine will not draw chemical.	<p>A. No chemical solution. B. Metering valve not open. C. Chemical line strainer clogged. D. Air leak in Chemical line. E. Metering valve clogged.</p>	<p>A. Replenish supply. B. Turn metering valve knob to open. C. Remove screen and clean. D. Tighten all fittings and hoses for the chemical line. E. Disassemble and clean.</p>
3. Low operating pressure.	<p>A. Insufficeint water supply.</p> <p>B. Incoming water hose too small. C. Water supply hose too long. D. Belt slippage.</p> <p>E. Worn belt. F. Spray tip worn or wrong size.</p> <p>G. Dirty or worn check valves in water pump. H. Water supply hose kinked. I. Inlet filter screen clogged. J. Motor runs slow.</p> <p>K. Air leak in inlet plumbing. L. Defective water pump. M. Leaking discharge hose.</p> <p>N. Chemical metering valve open and sucking air. O. Defective unloader.</p>	<p>A. The water supply must meet or exceed the maximum discharge volume specified in the PERFORMANCE section, and minimum water inlet pressure specified in the General section of the <b>MODEL SPECIFICATIONS</b> section.</p> <p>B. Use larger water supply hose. C. Use shorter water supply hose. D. Tighten belt per instructions in <b>MACHINE MAINTENANCE</b> insert. E. Replace bely per <b>CLEANER EXPLODED VIEW</b>. F. Replace with spray tip specified in the GENERAL section of <b>MODEL SPECIFICATIONS</b>. G. See <b>PUMP TROUBLE SHOOTING</b>.</p> <p>H. Straighten hose. I. Clean water filter screen or hose inlet screen. J. See "Pump engine starts slow or overheats and stops." K. Tighten all fittings. L. See <b>PUMP TROUBLESHOOTING</b>. M. If a water leak is found, <b>DO NOT OPERATE THE MACHINE</b>. Disconnect the power and replace hose. N. Resupply chemical, place soap screen in water, or shut off metering valve. O. Repair or replace unloader valve.</p>
4. Excessive, unusual noise.	<p>A. Pump. B. Defective motor.</p> <p>C. Pulleys rubbing. D. Misalignment of pump &amp; motor</p>	<p>A. See <b>PUMP TROUBLESHOOTING</b>. B. Call service technician or take engine to Reapir/ Warranty station. C. Adjust shields or pulley(s). D. Realign pump and engine.</p>
5. Belts slipping.	<p>A. Belts too losse. B. Excessive back pressure. C. Defective water pump.</p>	<p>A. Tighten per instruction on <b>MACHINE MAINTENANCE</b>. B. See "Excessive Back Pressure." C. See <b>PUMP SERVICE</b>.</p>

**CLEANER TROUBLESHOOTING (CONT.)**  
**ENGINE DRIVEN COLD WATER CLEANERS**

TROUBLE	POSSIBLE CAUSE	REMEDY
6. Excessive back pressure.	A. Spray tip built up with lime. B. Water pump turning too fast.	A. Remove and clean, or replace spray tip with tip specified in GENERAL section of <b>MODEL SPECIFICATIONS</b> . B. See <b>MODEL SPECIFICATIONS</b> .
7. Excessive vibration.	A. Defective belt. B. Defective Pump. C. Defective accumulator.	A. Remove and replace using belt specified in CLEANER EXPLODED VIEW or the GENERAL section of <b>MODEL SPECIFICATIONS</b> . B. See <b>PUMP TROUBLESHOOTING</b> . C. Recharge/replace.
8. Spray pattern is broken or irregular.	A. Clogged spray tip. B. Worn or incorrect spray tip.	A. Remove and clean spray tip per SPRAY TIP MAINTENANCE in <b>MACHINE MAINTENANCE</b> . B. Remove and replace with tip specified in the GENERAL section of <b>MODEL SPECIFICATIONS</b> or <b>MODEL EXPLODED</b> .
9. Engine will not start.	A. No fuel B. Plugged fuel filter. C. Defective or corroded battery cable D. Defective engine.	A. Replenish fuel as specified in engine owners manual. B. Change engine fuel filter. C. Drain and replenish fuel. D. Clean cables and cable ends. E. Call service technician.
10. Engine starts slow or overheats and stops.	A. Improper fuel. B. Excessive back pressure. C. Defective engine D. Dirt in fuel line or filters. E. Incorrect oil level F. Engine overloaded. G. Dirty air cleaner. H. Faulty spark plug.	A. Replenish fuel as specified in engine owners manual. B. See "Excessive Back Pressure." C. Call service technician, or take engine to Repair/Warranty station. D. Clean line or replace filter. E. Check oil level per engine owners manual. F. See "Excessive Back Pressure" G. Change air cleaner filters per engine owners manual. H. Change plug and set gap per engine owners manual.

# Final Assembly

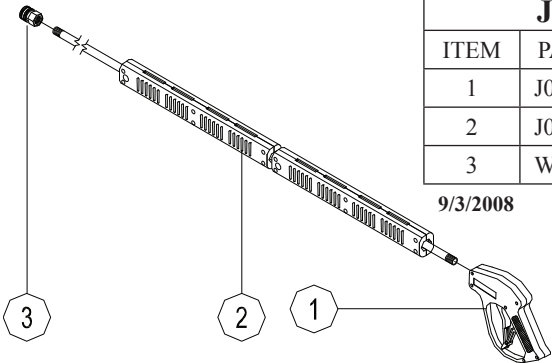


ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	3401-00710	ASS'Y, HOSE - 3/8 X 50 2 WIRE 5000PSI	1
2	435S-00183	WELDMENT, LIFT BRACKET	1
3	445SE-00603	ASSEMBLY, CLEANER - 16HP	1
4	535S-05150	WELDMENT, SHIELD-PULLEY SS 3 3/4 X 15 1/2 X 25	1
5	AS11-00906-PB	BRACKET, BATTERY 3/4 X 9 3/8	1
6	D02-00001E	DECAL, SERIAL NO	1
7	F04-00451	GROMMET, RUBBER	4
8	H04-13803	SCREW, MACHINE	6
9	H04-19000	SCREW, THREAD CUTTING - #10 - 24 UNC X 1/2	3
10	H04-25007	SCREW, CAP	2
11	H04-25024	SCREW, CAP	2
12	H04-31326	CAP, SCREW	4
13	H06-31300	NUT, LOCK - 5/16"	4
14	H09-12500	RIVET, POP	2
15	J00-15040-2	TIP, SPRAY - #1504	1
16	J06-00158-B	ASSEMBLY, GUN & WAND - 42"	1
17	Z01-00014	CAP, VINYL	2
18	Z01-00017	PLUG, TUBING	2
19	Z01-00084	CAP, FUEL	1

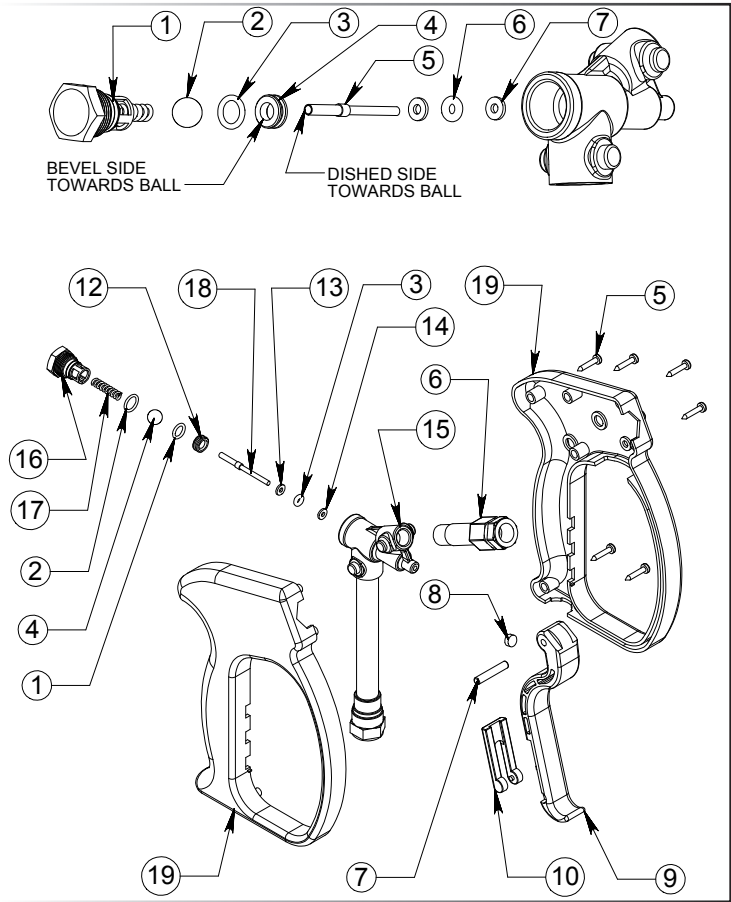
# Trigger Gun & Wand

J06-00158-B PART LIST		
ITEM	PART NUMBER	PART DESCRIPTION
1	J06-00158	Valve, Trigger Gun
2	J06-00104EZ	Assembly, Wand – 42”
3	W04-24225-A	Coupling, Female

9/3/2008



## J06-00158



# Repair Instructions

1. Remove screws from handles and remove handle housings.
2. With 18mm socket remove retainer being careful to catch the spring and ball as they fall out of the housing.
3. Remove and replace parts with those found in the kit.
4. Assemble in reverse order.

# Specifications

Maximum Volume	10.0 GPM / 37.9 LPM
Maximum Pressure	5000 PSI / 344.7 BAR
Rated Temperature	300° F / 150° C
Weight	1.8lbs / 0.8kg
Inlet	3/8” NPT Female
Outlet	¼” NPT Female

All dimensions are in inches unless otherwise noted.  
25.4 mm = 1 inch

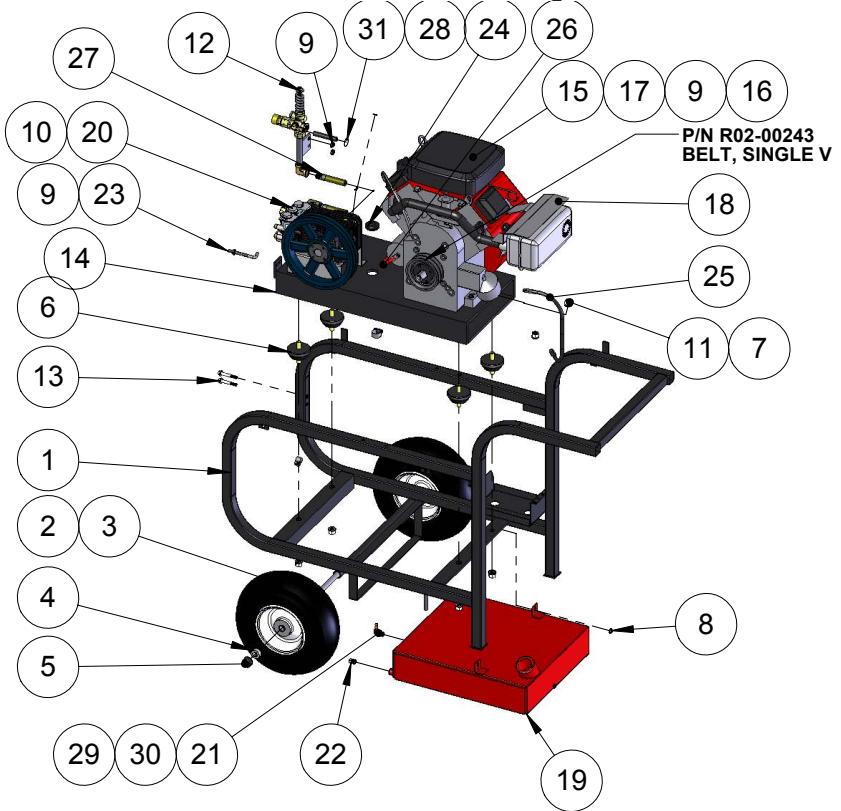
## Kit, Repair Part – Number J06-99158C

**Warning:** Do not use acid concentrates through the gun. Never secure trigger gun in an open position (trigger pulled back) by means other than the operator’s hand. Bodily harm may occur if the operator loses control of the trigger gun.

**Caution:** Always engage trigger safety latch when not in use.

J06-00158 PART LIST			
ITEM	PART NUMBER	PART DESCRIPTION	QTY
1	C07-01300-08	O-Ring – 1/16CS x 5/16ID	1
2	C07-01425	Filter, Water	1
3	J06-00121-07	O-Ring – 3/32CS x 1/8ID	1
4	J06-00121-15	Ball, SS 5/16	1
5	J06-00132-19	Screw, Self Tap – 3.5mm x 18mm	1
6	J06-00158-01	Fitting, Discharge – ¼ FNPT	1
7	J06-00158-02	Pin, Trigger – 5mm x 27.5mm	1
8	J06-00158-03	Cam	1
9	J06-00158-04	Trigger	1
10	J06-00158-05	Latch, Safety	1
11	J06-00158-06	Fitting, Inlet – 3/8 FNPT	1
12	J06-00158-08A	Seat, Valve	1
13	J06-00158-09	Washer, Flat	1
14	J06-00158-10	Washer, Flat - Brass	1
15	J06-00158-11	Housing, Valve	1
16	J06-00158-12A	Retainer, Valve	1
17	J06-00158-13	Spring, Compression	1
18	J06-00158-14	Pin, Valve – 4mm x 44mm	1
19	J06-99158A	Housing, Handle	1

# General Assembly

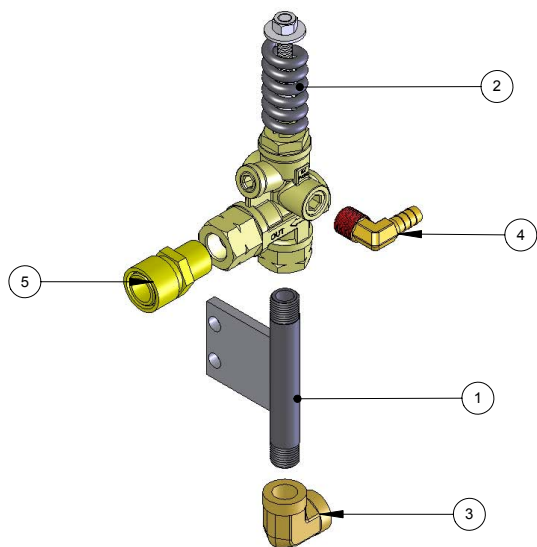


**445SE-00603**  
**03-31-2009**

ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.	ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	535S-00130	WELDMENT, FRAME	1	17	R03-00744	BUSHING, PULLEY	1
2	AR58-02800	ROD, CRS - 5/8" X 28"	1	18	F05-00436-2	KIT, MUFFLER	1
3	G02-10016B	ASS'Y, TIRE & RIM - 13"	2	19	535S-10125	TANK, FUEL - 3 13/16 X 15 5/8 X 17 5/8 4.5 GAL	1
4	H06-62503	COLLAR, SHAFT - 5/8"	2	20	445SE-00501	ASSEMBLY, PUMP	1
5	Z01-00029	CAP, VINYL - ROUND	2	21	W02-10031	BARB, HOSE	1
6	H10-50000	MOUNT, SHOCK	4	22	E09-00002-2	PLUG, PIPE	1
7	H05-50001	WASHER, HELICAL LOCK - 1/2"	8	23	H03-31311	BOLT, J-5/16-18UNC x 3 1/2	1
8	H06-25003	NUT, HEX	2	24	F04-00455	GROMMET, RUBBER	1
9	H06-31300	NUT, LOCK - 5/16"	7	25	F05-00220	CABLE, BATTERY - 20" EYE/EYE BLACK	2
10	H06-37500	NUT, LOCK-3/8-16UNC HEX	4	26	F05-00220-R	CABLE, BATTERY - 20" EYE/EYE RED	2
11	H06-50001	NUT, 1/2 - 20UNF	8	27	K02-03216A2	ASSEMBLY, HOSE	1
12	445S-00515	ASSEMBLY, UNLOADER	1	28	K20-00900	HOSE, GAS	1
13	H04-31326	CAP, SCREW	2	29	K33-01500	HOSE, WATER - 3/8 X 15"	1
14	445S-00134	WELDMENT, MOUNT	1	30	W02-00033	CLAMP, HOSE	2
15	F05-00439	ENGINE, GAS - 16HP, VANGUARD	1	31	W02-00036	CLAMP, HOSE	2
16	R04-00006	BUSHING, PULLEY	1				



# Unloader Assembly



**ASSEMBLY, UNLOADER**  
**p/n: 445S-00515**  
**4/3/2009**

ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	835S-00514	BRACKET, UNLOADER	1
2	C07-03800X	VALVE, UNLOADER (GREY)	1
3	E08-00010-5	ELBOW, PIPE	1
4	W02-10040-8	BARB, HOSE	1
5	W04-34155-A	COUPLER, 3/8F X 1/2MNPT	1

# Unloader Valve Breakdown

## C07-03700X, C07-03800X

### Unloading Adjustment

1. Install an appropriate pressure gauge in pump head outlet. The gauge should have a range twice the operating pressure.
2. Loosen nut (Item 19) and turn the knob (Item 20) counter clockwise until minimum spring tension.
3. Open the trigger gun, start the pump, and observe pressure gauge reading. Slowly tighten the knob.
4. Close and open the trigger gun to check unloading pressure and bypass function of the unloader valve. The unloading pressure should not exceed operating pressure more than 400 PSI.
5. Lock the setting by tightening the nut (Item 19)

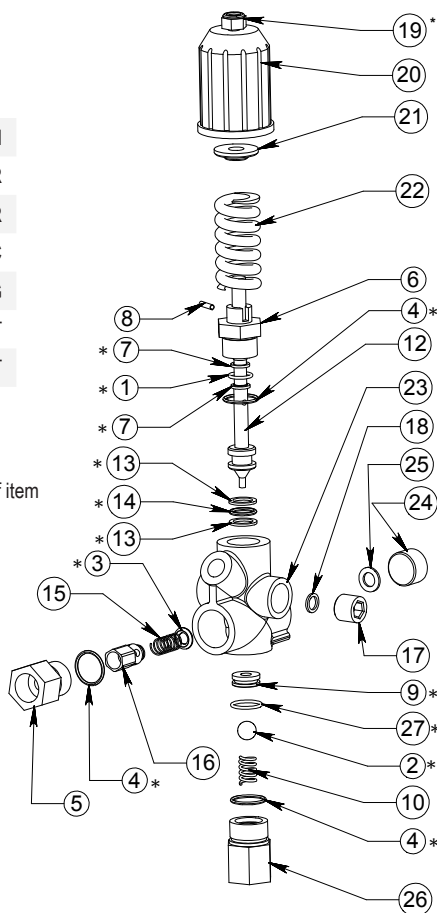
Note: Once the operating pressure is reached, turning the knob clockwise will increase the unloading pressure only.

### Specifications

Maximum Flow	7.8 GPM / 30 LPM
*Max Unloading Press.	3650 PSI / 251 BAR
**Max Unloading Press.	4200 PSI / 290 BAR
Maximum Temperature	190°F / 88°C
Weight	2.1 LBS / 0.91 KG
Bypass	¼ FNPT
Inlet & Discharge	3/8 FNPT
*P/N C07-03700    **P/N C07-03800	

### Repair Parts Package

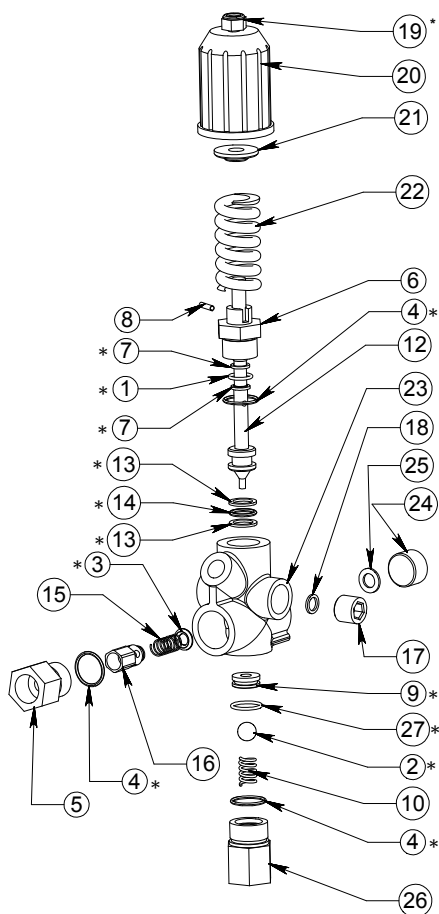
\*C07-03700K – Includes 1 of item #1, 1 of item #2, 1 of item #3, 3 of item #4, 2 of item #7, 2 of item #13, 1 of item #14, 1 of item #27



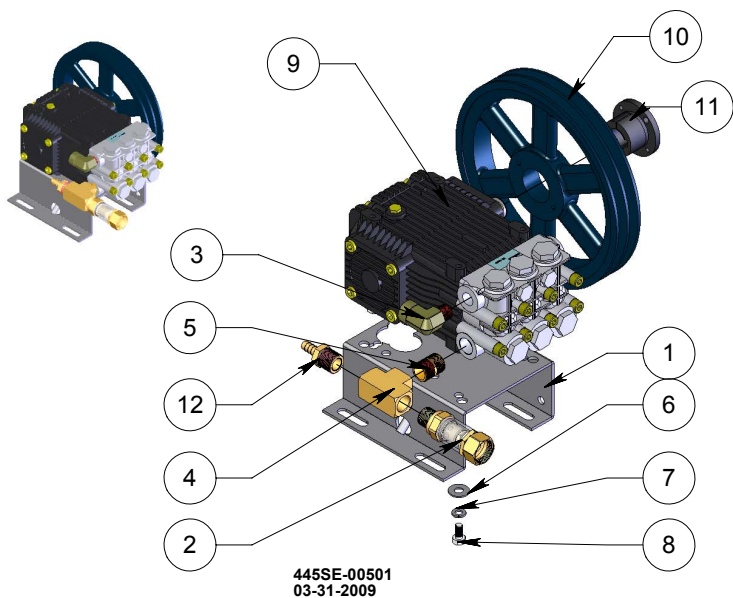
## PART LISTS

ITEM	PART NUMBER	PART DESCRIPTION	QTY
1	8RS6-000SV01	O-Ring – 1/16CS x 1/2ID	1
2	C07-02000-18	Ball, SS 11/32	1
3	C07-02000-20	O-Ring	1
4	C07-02300-08	O-Ring – 11/16ID	3
5	C07-03700-1	Fitting, Outlet – 3/8	1
6	C07-03700-11	Guide Piston	1
7	C07-03700-12	Ring, Anti-Extrusion	2
8	C07-03700-15	Pin, Roll	1
9	C07-03700-21	Guide, Piston – SS	1
10	C07-03700-23	Spring, Compression	1
12	C07-03700-26	Piston	1
13	C07-03700-28	Ring, Anti-Extrusion	2
14	C07-03700-29	O-Ring – 3/32 x 7/16ID x 3043	1
15	C07-03700-3	Spring, Compression	1
16	C07-03700-4	Orifice, Shutter	1
17	C07-03700-6A	Plug, 3/8NPT	2
18	C07-03700-6B	Gasket, Washer – 1/16CS x 5/16 x 7/16OD	2
19	C07-03700-7	Nut, Ny-Lock	1
20	C07-03700-8	Knob, Adjustment	1
21	C07-03700-9	Follower, Spring	1
*22	C07-0370010C	Spring, Blue	1
**22	C07-0370010D	Spring, Black	1
23	C07-0370018B	Housing, Unloader – 3/8 FNPT	1
24	C07-0370019A	Plug	1
25	C07-0370019B	Gasket, Washer – 1/16CS x 5/16ID x 9/16OD	1
26	C07-03800-24	Guide, Ball	1
27	N07-20028	O-Ring – 1/16CS x 7/16ID	1

\*P/N C07-03700    \*\*P/N C07-03800



# Pump Assembly



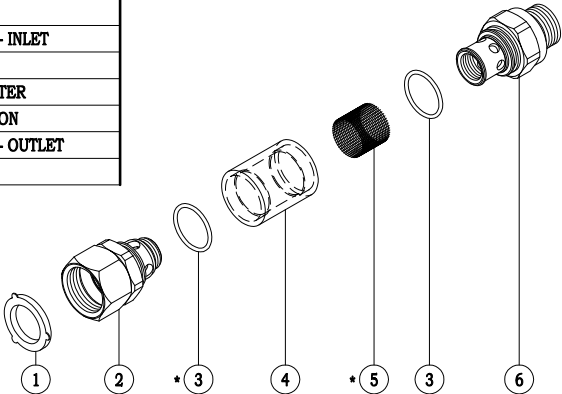
ITEM NO.	PART NUMBER	PART DESCRIPTION	QTY.
1	4355EB-00513	MOUNT, PUMP	1
2	C04-00144	FILTER, WATER	1
3	E08-00011-58	ELBOW, PIPE	1
4	E10-00005-4	TEE, PIPE	1
5	E15-00010-48	NIPPLE, BRASS 1/2"	1
6	H05-31300	WASHER, FLAT - 5/16	4
7	H05-31304	WASHER	4
8	N07-20048	SCREW, CAP	4
9	N09-00053	PUMP, WATER - RK1528HN	1
10	R03-00794	PULLEY, DBL	1
11	R04-00001	BUSHING, PULLEY	1
12	W02-10030-8	BARB, HOSE	1

**FILTER, WATER - P/N C04-00144, C04-00145, C04-00146, C04-00147**

SPECIFICATIONS	MAINTENANCE
MAXIMUM FLOW .....8.0 GPM / 30.3 LPM	1. With wrench on hex behind garden hose nut and opposite end of glass, unscrew the filter. Be cautious of the glass tube as it don't fall onto a sharp object.
MINIMUM INLET PRESSURE.....15 PSI / 1.02 BAR	2. Clean the screen and glass tube.
MAXIMUM INELT PRESSURE.....150 PSI / 10.3 BAR	3. Check o-rings for cuts, cracking or abrasion.
MAXIMUM TEMPERATURE .....180°/ 82°C	4. Reinstall screen and glass tube onto the machine, and reinstall the garden hose swivel.
WEIGHT.....0.5 LBS. / 0.23 KG	
BYPASS.....1/4 FNPT (C04-00146, C04-00147)	
INLET/OUTLET.....3/8 NPT (C04-00145, C04-00147)	
INLET/OUTLET.....1/2 NPT (C04-00144, C04-00146)	
DIMENSIONS.....1.125" X 3.75"	

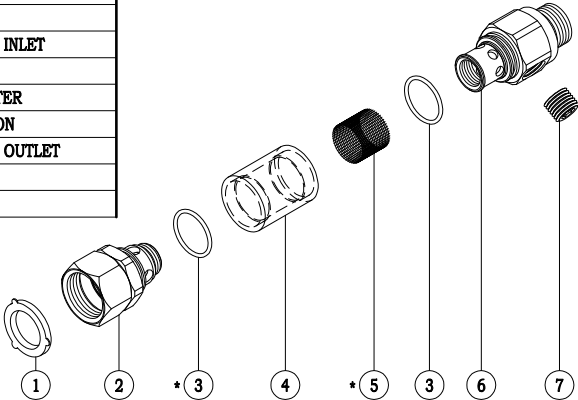
**P/N C04-00144, C04-00145**

PARTS LIST			EXPLODED VIEW			
ITEM	PART NO.	DESCRIPTION				
1	C05-00271	WASHER, HOSE				
2	-----	HOUSING, FILTER - INLET				
* 3	C07-02700-08	O-RING				
4	C04-00144-01	TUBE, GLASS - FILTER				
* 5	C04-00144-03	SCREEN, FILTRATION				
6	-----	HOUSING, FILTER - OUTLET				
*	C04-00148	KIT, REPAIR				



**P/N C04-00146, C04-00147**

PARTS LIST			EXPLODED VIEW			
ITEM	PART NO.	DESCRIPTION				
1	C05-00271	WASHER, HOSE				
2	-----	HOUSING, FILTER - INLET				
* 3	C07-02700-08	O-RING				
4	C04-00144-01	TUBE, GLASS - FILTER				
* 5	C04-00144-03	SCREEN, FILTRATION				
6	-----	HOUSING, FILTER - OUTLET				
7	C07-02000-26	PLUG, PIPE				
*	C04-00148	KIT, REPAIR				



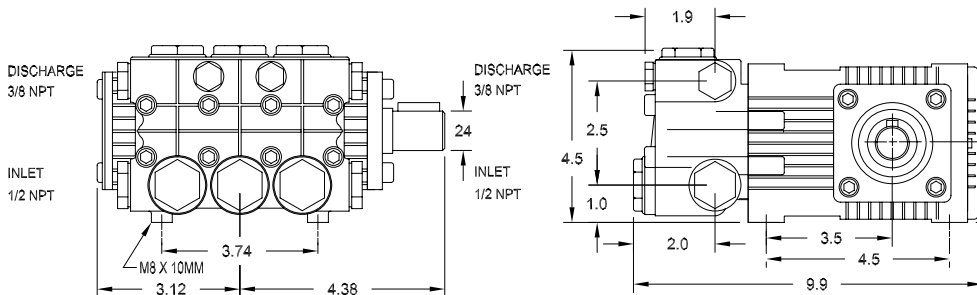
# Water Pump

## N09-00053

PUMP, WATER - P/N N09-00053

### DIMENSIONS

RK1528HN  
AR



ALL DIMENSIONS ARE IN  
INCHES UNLESS OTHERWISE  
NOTED. 25.4 MM = 1 INCH

### PERFORMANCE

DISCHARGE VOLUME.....4.0 GPM / 15.1 LPM  
PUMP HEAD PRESSURE.....4000 PSI / 275.0 BAR

### GENERAL

CRANKSHAFT ROTATION.....CLOCKWISE AND COUNTER CLOCKWISE  
MAXIMUM SPEED.....1450 RPM  
MAXIMUM PUMPED FLUID TEMPERATURE.....165 F / 74 C  
INLET PRESSURE.....-9 IN HG @ 75 F TO 116 PSI / -0.3 BAR @ 24 C TO 8 BAR  
WEIGHT (WET).....20.0 LBS / 8.8 KG

### LUBRICATION

OIL CHANGE INTERVAL .....AFTER FIRST 50 HOURS THEN AFTER 500 HOURS  
OIL TYPE.....SAE 30 (NON-DERTERGENT)  
CRANKCASE CAPACITY.....15.0 FL OZ / 0.44 LT

### TORQUE

VALVE PLUG.....40 FT LBS / 5.5 KG M REAR COVER TO CRANKCASE.....18 FT LBS / 2.4 KG M  
MOUNT TO CRANKCASE.....32 FT LBS / 4.4 KG M RETAINER TO CRANKCASE.....18 FT LBS / 2.4 KG M  
\* PLUNGER NUT TO CROSSHEAD.....8.8 FT LBS / 1.2 KG M HEAD TO CRANKCASE.....18.0 FT LBS / 2.5 KG M

**\*NOTE:** When plunger nut is removed, install a new copper washer and flinger washer to ensure proper and seal of ceramic plunger. If same copper washers are reused cracking or a poor seal may result.

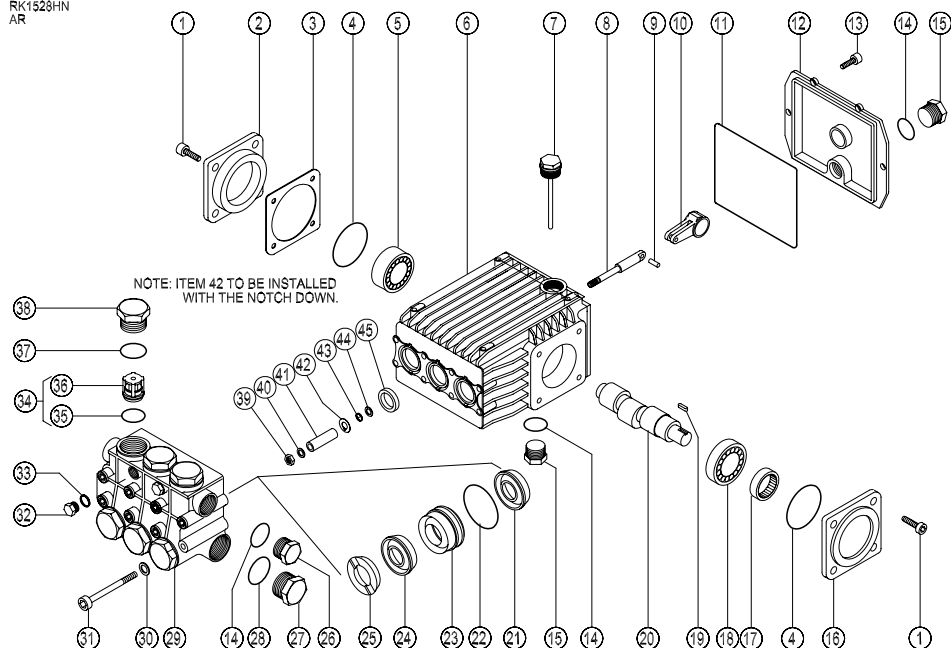
### REPAIR PARTS PACKAGES

PART NO.	DESCRIPTION	ITEM	QTY	PART NO.	DESCRIPTION	ITEM	QTY	PART NO.	DESCRIPTION	ITE
N09-992864	VALVE ASSEMBLIES			N09-991857	V-PACKING, SEAL, & O-RING			N09-992757	PLUNGERS - 18MM	
	ASS'Y, CHECK VALVE	36	6		SEAL, WATER	21	3		PLUNGERS	4
	O-RING	35	6		O-RING	22	3			
N09-991855	OIL SEALS & O-RINGS				PACKING, V - 18MM	24	3	N09-991829	ADAPTER, MALE - 18MM	
	O-RING, RETAINER	4	2						ADAPTER, MALE	2
	O-RING, COVER	11	1							
	SEAL, OIL	45	3							
	SEAL, OIL - CRANKSHAFT	17	1							

# BREAKDOWN, PUMP - N09-00053

## EXPLODED VIEW

RK1528HN  
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## PARTS LIST

ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
1	N09-850370	SCREW, CAP	24	N09-880320	V-PACKING - 18MM
2	N09-1380050	RETAINER, BEARING - CLOSED	25	N09-960110	ADAPTER, MALE - 18MM
3	N09-1380120	SHIM - 0.1 MM	26	N09-1981180	PLUG - 3/8" NICKEL PLATED
4	N09-640030	O-RING	27	N09-960870	PLUG - 1/2" NICKEL PLATED
5	N09-2280240	BEARING	28	N09-180101	O-RING
6	N09-1382770	CRANKCASE	29	N09-1381070	HEAD, PUMP - NICKEL PLATED
7	N09-0880130	DIPSTICK, OIL	30	N09-1381850	WASHER, FLAT
8	N09-1380920	CROSSHEAD	31	N09-820150	SCREW, CAP
9	N09-1380060	PIN, CROSSHEAD	32	N09-1380690	PLUG - 1/4" NICKEL PLATED
10	N09-1383050	ROD, CONNECTING	33	N07-20028	O-RING
11	N09-1780510	O-RING	34	N09-992864	KIT, VALVE ASSEMBLY
12	N09-1789010	COVER, PUMP HOUSING - REAR	35	P04-00212	O-RING
13	N09-1343510	SCREW, CAP	36	-----	ASSEMBLY, VALVE
14	C03-00503-01	O-RING	37	N09-0960160	O-RING
15	N09-880530	PLUG - 3/8"	38	N09-960850	PLUG - S.S.
16	N09-1380040	RETAINER, BEARING - OPEN	39	N09-962010	NUT, HEX
17	N09-880520	SEAL, OIL	40	N09-962000	WASHER, FLAT - COPPER
18	N09-840370	BEARING	41	N09-1380940	PLUNGER - 18MM
19	N09-1380520	KEY	42	N09-1380950	WASHER, FLINGER - COPPER
20	N09-2280060	CRANKSHAFT	43	N09-600180	O-RING
21	N09-880330	SEAL, WATER - 18MM	44	N09-1080401	RING, ANTI-EXTRUSION
22	N07-20016	O-RING	45	N09-880520	SEAL, OIL
23	N09-1380090	ADAPTER, FEMALE - 18MM			

# Pump Maintenance Record

Oil Change		
Month/Day/Year	Operating Hours	Oil Brand & Type

Pump Service		
Month/Day/Year	Operating Hours	Type of Service



# Plunger Pumps

## Service Pumps (continued)

with your fingers (do not use any tools you may damage the seal). Make sure the seal is totally seated against the head ring. (See Figure 16 & 17)

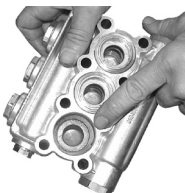


Figure 17

3. Place the brass intermediate ring squarely over the high-pressure seal.



Figure 18

4. Installing the low-pressure seal with the closed flat side of the seal being pushed into the piston guide (when finished you should be looking at the open side of the seal). Install split O-ring (Hold in place with light grease). (See Figure 18)

5. Install the retainer O-ring.
6. Squarely seat the retainer into the head and push with even pressure until it snaps into position. (See Figure 19)



Figure 19

## Servicing the Plungers

If the plungers are not damaged they do not need any servicing.

Tools required: 17mm socket, ratchet, mechanics pick, taper blade gasket scraper, thread sealant and torque wrench.

**NOTE:** Be very careful when working with the plungers, they are made from ceramic which is brittle and can be damaged.

Any time you remove a plunger it is recommended you replace the slinger washer, O-ring and top plunger washer. The washers are a cushion for the ceramic plunger and compress when first used, O-ring will set to create a seal and usually will not spring back to its original shape. By not replacing these parts you run the risk of breaking a plunger or having a water leak.

## Disassembly:

1. Remove the plunger retainer nut. (See Figure 20)
2. Insert the gasket scraper between the copper washer and plunger to remove the washer. (See Figure 21)
3. Twist and pull the plunger off the plunger rod. (See Figure 22)
4. Remove the plunger rod O-ring seal and split back-up ring with the mechanics pick.
5. Remove the brass slinger. At this point clean any thread locker that is left on the plunger rod and retaining nut threads.



Figure 20

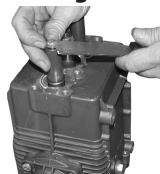


Figure 21



Figure 22

# Plunger Pumps

## Assembly:

1. Install the slinger washer.
2. Install the plunger rod O-ring and split back-up ring. Place a light film of oil on the O-ring and back-up ring. **NOTE:** The O-ring is closest to the threaded end of the rod.

3. Install the plunger by pushing straight down and twisting slightly in either direction. Make sure you fully seat the plunger. (See Figure 23)



Figure 23

4. Install the small copper washer on top of the plunger and place a small quantity of thread sealant in the thread. Install the plunger nut and tighten to the required torque. (See Figure 24)



Figure 24

3. Torque the head bolt as shown in the tightening sequence diagram. (See Figure 27 & 28)



Figure 27



Figure 28

## Oil Change

Change oil after first 50 hours of use. Then every 500 hours. Refer to parts breakdown for oil type.

## Pump Head to Drive End Installation

1. Turn the crankshaft to align the plungers as shown. (See Figure 25)
2. Place the head evenly onto the plungers and push it until it makes contact with the drive end of the pump. (See Figure 26)

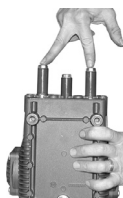


Figure 25

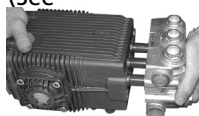


Figure 26

# Plunger Pumps

## Service Pumps

### Servicing the Valves

The inlet and discharge valves in this series pumps are all the same. The valves are located under the six 27mm hex plugs. The inlet valves are located on the lower row and the discharge valves are located on the top row of the pump head.

Tools required: 27mm socket, ratchet, needle nose pliers, mechanics pick and torque wrench.

#### Valve Removal:

1. Remove the valve cap. (See Figure 5)
2. Inspect the valve cap O-ring for any damage, replace if necessary. (See Figure 6)



Figure 5



Figure 6

3. Use the needle nose pliers to remove the valve. (See Figure 7)
4. Use a small probe to move the poppet up and down to assure that the valve is functioning properly and that no debris is stuck in the valve.
5. Using the mechanics pick remove the valve seat O-ring and inspect for any damage, replace if necessary.

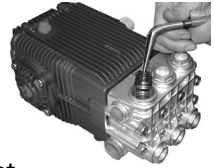


Figure 7

#### Valve Assembly:

1. Install the valve seat O-ring squarely into the bottom of the manifold. (See Figure 8)
2. Insert the valve assembly squarely into the port pushing it into the O-ring.
3. Install the valve cap and torque to the proper specification. (See Figure 9)



Figure 8



Figure 9

### Servicing the Packings/Seals

To access the water seals for inspection or replacement, you will first need to remove the head of the pump.

Tools required: 8mm hex socket, ratchet, (2) long screwdrivers, reversible pliers, mechanics pick and torque wrench.

# Plunger Pumps

## Service Pumps (continued)

### Disassembly:

1. First remove the eight 8mm head bolts.

2. Place the screwdrivers as shown between the head and crankcase of the pump, lifting one up and the other down. The head should start to lift off of the plungers. (See Figure 10)



Figure 10

3. When you remove the head you may notice that some of the water seals have stayed on the plungers and some in the head. To remove the seals from the plungers simply turn the assemblies and pull off. (See Figure 11)



Figure 11

4. If the seal assemblies are in the head use the reversible pliers to grab the seal retainer on the inside of the outside ring, twist the retainer in either direction (this is done to free the retainer O-ring which is stuck to the manifold) and lift out. (See Figure 12)

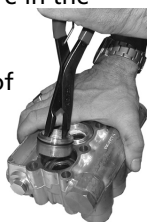


Figure 12

5. With your finger pull out the brass intermediate guide ring. (See Figure 13)
6. With your fingers pull the high-pressure seal and head ring out of the head. (See Figure 14)
7. The low-pressure seal is located in the brass seal retainer. Using the mechanics pick, go in between the seal and retainer and pull the seal straight out. **NOTE:** Models have a split support O-ring. (See Figure 15)
8. Remove the seal retainer O-ring with the mechanics pick.



Figure 13



Figure 14



Figure 15

### Assembly:

1. Install the plastic head ring into the head (the flat side is on the bottom).
2. Install the high-pressure seal. Place the seal so the open "V" portion is toward the head ring. You need to place the seal at an angle and pull and push to work the seal into position

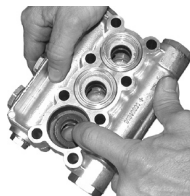


Figure 16

# Troubleshooting Pump

Trouble	Possible Cause	Remedy
Oil leaking in the area of water pump crankshaft	Worn crankshaft seal, bad bearing, grooved shaft, or failure of retainer o-ring.	Remove and replace.
Excessive play on crankshaft	Defective bearings.	See "Worn bearing."
	Excess shims.	Set up crankshaft.
Loud knocking in pump	Loose connecting rod screws.	Tighten connecting rod screws per PUMP SPECIFICATIONS
	Worn connecting rod.	Replace connecting rod per PUMP MAINTENANCE.
	Worn bearings.	Replace bearings per PUMP MAINTENANCE.
	Loose plunger bushing screw.	Tighten plunger screw per PUMP SPECIFICATIONS.
Oil leaking at the rear portion of the pump	Damaged or improperly installed oil gauge window gasket or rear cover.	Replace gasket or o-ring.
	Oil gauge loosed.	Tighten oil gauge.
	Rear cover screws loose.	Tighten rear screws to torque values in PUMP SPECIFICATIONS.
	Pump overfilled with oil, displaced through crankcase breather hole in oil cap/dipstick.	Drain oil. Refill to recommended oil level as stated in OIL LEVEL in PUMP MAINTENANCE.
Water in crankcase	May be caused by humid air condensing into water inside.	Maintain or step up lubrication schedule.
	Worn or damaged plunger screw o-ring.	Remove and replace. See PLUNGER SERVICE in PUMP MAINTENANCE.
Worn bearing	Excessive belt tension.	See BELT TENSION in MACHINE MAINTENANCE.
	Oil contamination.	Check oil type and change intervals per PUMP SPECIFICATIONS.
Short bearing life	Excessive belt tension.	See BELT TENSION in MACHINE MAINTENANCE.
	Misalignment between pump and motor.	Re-align pump and motor.
	Oil has not been changed on regular basis.	Check oil type and change intervals per PUMP SPECIFICATIONS.
Short seal life	Damaged plunger bushing.	Replace plunger bushing.
	Worn connecting rod.	Replace connecting rod.
	Excess pressure beyond the pump's maximum rating.	Match pressure stated in PUMP SPECIFICATIONS.
	High water temperature.	Lower water temperature stated in PUMP SPECIFICATIONS.
Dirty or worn check valves	Normal wear.	Remove and replace.
	Debris.	Check for lack of water inlet screens.

Presence of metal particles during oil change	Failure of internal component.	Remove and disassemble to find probable cause.
	New pump.	New pumps have machine fillings and debris and should be drained and refilled per PUMP SPECIFICATIONS.
Water leakage from under head	Worn packing.	Install new packing.
	Cracked/scored plunger.	Remove and replace plunger.
	Failure of plunger retainer o-ring.	Remove and replace plunger retainer o-ring.
Loud knocking noise in pump	Pulley loose on crankshaft.	Check key and tighten set screw.
	Defective bearing.	Remove and replace bearing.
	Worn connecting rod, crankshaft, or crosshead.	Remove and replace.
Frequent or premature failure of the packing	Scored, damaged, or worn plunger.	Remove and replace plungers.
	Overpressure to inlet manifold.	Reduce inlet pressure.
	Abrasive material in the fluid being pumped.	Install proper filtration on pump inlet pumping.
	Excessive pressure and/or temperature of fluid being pumped.	Check pressures and fluid inlet temperature. Be sure they are within specified range.
	Over pressure of pumps.	Reduce pressure.
	Running pump dry.	Do not run pump without water.
Low Pressure	Dirty or worn check valves.	Clean/replace check valves.
	Worn packing.	Remove and replace packing.
	Belt slipping.	See BELT TENSION in MACHINE MAINTENANCE.
	Improperly sized spray tip or nozzle.	See MACHINE SPECIFICATIOSN for specified spray tip or nozzle.
	Inlet filter screen is clogged.	Clean inlet filter screen.
	Pitted valves.	See VALVE SERVICE in PUMP MAINTENANCE.
Erratic pressure; pump runs rough	Dirty or worn check valves.	Clean/replace check valves.
	Foreign particles in valve assemblies.	
	High inlet water temperature.	See temperature in PUMP SPECIFICATIONS.
Excessive vibration	Dirty or worn check valves	See "Dirty or worn check valves."
Scored plungers	Abrasive material in fluid being pumped.	Install proper filtration on pump inlet plumbing.
Fitted plungers	Cavitation.	Decrease inlet water temperature and/or increase inlet water pressure.

# Warranty Policy

Machines are guaranteed to be free from defects in material or workmanship under normal use and service for period of one year after delivery from the factory. Any part (other than vendor items) that is determined to be warranty will be repaired or replaced at **NO CHARGE** provided the warranty registration form is filled out in its entirety and the part is sent back freight prepaid. Any replacement parts accepted as warranty will be returned to you freight prepaid.

All parts supplied to us by other manufacturers will be subject to their guarantee and warranty. Generators, motors, and engines are required by vendors to be repaired or replaced by authorized warranty repair stations. The manufacturer will assist you in locating warranty stations around the country in cases where that is necessary. Select items carry a six-month warranty such as unloaders, triggers guns, etc.

The manufacturer, at its option, will repair or replace defective parts only, and does not allow for field labor charges for removal, installation, analysis, travel expense, or special freight expenses incurred for replacement parts.

Warranty does not apply to normal wear and tear including, but not limited to, freezing damage, freight damage, damage caused by misuse or misapplication, chemical related failures, contaminated filters and screens, moisture related fuel pump failures, stuck check valves, pump packings or seals, nozzles or orifices, paint, hoses, and gauges.

**For full warranty information, contact your delivering distributor or contact the manufacturer at [info@warrantysvc.com](mailto:info@warrantysvc.com)**

